REMARKS

Applicants appreciate the consideration shown by the Office as evidenced by the Office Action mailed on April 22, 2005. In that Office Action, the Examiner rejected claims 1-26. In this Response, Applicants have amended claims 1, 2, 7, 8, 10, 19-21, 24, and 26. Claims 1-26 remain pending in the present application. Applicants respectfully request favorable reconsideration in light of the above amendments and the following remarks.

1. Claim Rejections--35 U.S.C. §112

Claims 1-26 were rejected under 35 U.S.C. §112, first paragraph. Applicants respectfully traverse this rejection.

Independent claims 1, 19, 20, and 26 have been amended to address the Examiner's remarks concerning failure of these claims to address the enablement requirement. In particular, the Examiner expressed confusion over the structural relations among certain terms used in the originally filed claims. In the amendments made herein, Applicants have applied language from the originally filed specification to the claims to further elucidate the structural relations among claim elements. No new matter has been added. Applicants include the following remarks to further assist the Examiner in the analysis of the claims.

There are two over-arching aspects to the material recited in the claims of the present application. The first is the structure of the material—the particular configuration of structural components as recited in the claims. The second aspect is the selection of characteristics for the interfaces. The interfaces are designed to distribute mechanical damage, rather than allow the damage to run catastrophically through the material in the manner common to strong, brittle materials. This is accomplished by careful engineering of interfacial structure, material properties, etc. As discussed in the specification and recited in the claims, the distributive nature of the interfaces is not wholly a function or result of the structure of the material, but is also a function of engineering of the characteristics of the interfaces. The combination of structure and interfacial properties provides a material with high strength and high tolerance for damage.

A. Structure

The material recited in the independent claims comprises a plurality of structural components. Each structural component has an associated characteristic length (see paragraph

0014). The plurality of structural components is configured in a plurality of size classes; that is, each member of the plurality of structural components can be classified based on its characteristic length into one of a number of size classes. Each size class has an associated unique mean characteristic length, and members of a given size class have characteristic lengths that fall within 25% of the mean characteristic length calculated for all members of the class (paragraph [0014]).

There are two different types of size classes defined in the application and recited in the claims. The first type of size class is the base unit size class. This size class contains structural components having the smallest characteristic length in the material, and thus the base unit size class has the smallest mean characteristic length of all of the size classes. Structural components in this size class comprise a bulk phase; they are the fundamental structural components of the material. See paragraph [0015]. The second type of size class is a modular size class. Any non-zero number of modular size classes may exist in the material. Structural components belonging to a modular size class comprise a plurality of structural components belonging to smaller size classes, thus creating a hierarchy of structure. See paragraph [0016]. For example, a component of a first modular size class may be made up entirely of a number of components belonging to the base unit size class. Moreover, a component of a second modular size class, one having a larger mean characteristic length than the first modular size class, may be made up of components from the first modular size class, which in turn are each made up of components belonging to the base unit size class. In any event, as recited in the amended independent claims, a structural component of a given modular size class always comprises a plurality of structural components of the base unit size class, and, if smaller modular size classes exist in the material, the given modular size class will further comprise a plurality of structural components of smaller modular size classes. This concept of structural hierarchy is clearly illustrated in Figure 1 and explained in paragraphs [0016]-[0017].

B. Interfaces

As recited in the instant claims, the plurality of structural components making up the material are bonded together at interfaces. The selection of characteristics, such as, for example, material properties of interfacial materials, mechanical structure of interfaces, etc. is carefully done in order to create an environment in which mechanical damage is distributed along a convoluted pathway rather than directly and catastrophically through the material. See, for example, the description in paragraph [0024]. Claim 1 recites the strategy employed by Applicants to achieve this desired result: interfaces bonding together higher-level (larger) structural components require more energy for damage propagation than the interfaces of the smaller size classes of structural

components contained within the higher-level components. There is an abundance of support in the specification for various manners of achieving such interfacial properties. Paragraphs [0024] and [0025] describe the manipulation of interfacial phase material selection and structure (such as via controlled porosity) as a means of controlling the energy required to propagate damage along an interface. Paragraph [0023] also describes how such a manipulation can be done for mechanically interlocked interfaces (control of asperity amplitude and wavelength, for instance). Paragraphs [0021]-[0023] describe interfaces in general and how they are fabricated in various embodiments of the present invention.

Applicants respectfully submit that, in view of the amendments and remarks presented herein, along with the referenced sections of the originally filed specification, the rejected claims are compliant with the first paragraph of section 112. Applicants respectfully request favorable reconsideration of the claims.

Claims 1-26 were also rejected under 35 U.S.C. §112, second paragraph. Applicants respectfully traverse this rejection.

The majority of issues (in particular, those related to structural relationships among claim elements) cited by the Examiner in the second paragraph rejection are duplicative of issues cited in the first paragraph rejection. Applicants believe that the amendments made to the claims and the remarks provided above adequately address these issues, and respectfully request reconsideration. Applicants address the remaining issues, below.

The Examiner appears to have objected to the somewhat functional language used in claims 1, 2, 19-20, and 26 with respect to interfacial characteristics. This language has been amended to remove recitation of the ultimate desired effect (distribution of damage) in favor of a recitation of specific characteristics of the interfaces. As described above, the recitation of interfacial characteristics (i.e., higher level structural components have more damage resistant interfaces than lower level structural components) is a further limitation placed on the material and is due to selection of interfacial materials, structure, etc.; it is not a direct consequence or result of the recited arrangement of structural components.

"Functional language does not, in and of itself, render a claim improper." MPEP §2173.05(g), citing *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971). Instead, the statutory compliance of functional limitations is judged based upon what one of ordinary skill in the art would

learn from the limitation in the context in which it is presented. MPEP §2173.05(g). Applicants respectfully submit that the amended recitation of interfacial characteristics presented in claims 1, 2, 19-20, and 26 comply with the second paragraph of section 112 when evaluated against the above standard. The recitation of interfacial damage propagation properties and/or toughness found in these claims is analogous to the recitation found acceptable under section 112, second paragraph, in *In re Barr*, 444 F.2d 588, 170 USPQ 33 (CCPA 1971) (cited in MPEP §2173.05(g)): a radical on a chemical compound recited as being "incapable of forming a dye with said oxidizing developing agent." The recitations in the enumerated claims of the present application are believed to be acceptable because they, like the recitation in *In re Barr*, set definite boundaries for the scope of the claims. Applicants respectfully request favorable reconsideration of these claims.

Claim 6 was rejected for lack of antecedent basis for limitations referring to first and second size classes. Applicants believe this rejection was meant to be directed at claim 7. Applicants have amended claim 7 to provide proper antecedent basis, and have amended claim 8 to be compatible with amended claim 7, from which claim 8 depends.

Claim 10 has been amended to remove the term "compounds," to which the Examiner objected.

Finally, claim 25 was rejected as being unclear. Claim 25 recites "wherein said article comprises a component of a gas turbine assembly." Applicants respectfully submit that this claim recites an article that is at least a portion of a gas turbine assembly. For example, a gas turbine assembly itself comprises components of a gas turbine assembly. A combustor for a gas turbine assembly also comprises components of a gas turbine assembly (e.g. a combustor liner, transition piece, etc.). A turbine also comprises components of a gas turbine assembly (e.g. turbine blades, rotor, stator, etc). These are non-limiting examples of articles covered under claim 25. Further support is provided in paragraph [0027] of the present application. Applicants respectfully submit that claim 25 is thus compliant with the second paragraph of section 112.

2. Claim Rejections--35 U.S.C. §102

Claims 1, 3-6, 8-17, 20, and 24-25 were rejected under 35 U.S.C 102(b) as being anticipated by Eida et al. (U.S. 5,869,929; "Eida"). Applicants respectfully traverse this rejection.

The applied reference fails to teach, suggest, or disclose all of the limitations of independent claims 1 and 20. Eida describes a multicolor luminescent device comprising a color conversion

material in which a plurality of shielding layers and a plurality of different color conversion layers are separately and repeatedly assembled on the same substrate in an alternating fashion; an organic electroluminescent (OEL) material comprising a plurality of OEL elements disposed on the same substrate, with a layer of transparent material disposed between the color conversion material and the OEL material.

Eida fails to teach, suggest, or disclose the limitations pertaining to interfaces recited in claims 1 and 20 of the present invention. With regard to the interfacial properties, the Examiner states, "Since Eida's device comprises the same structure as claimed, the same structure would also have the same properties and function such as the mechanical function as recited in claims 1 and 20." However, claims 1 and 20 as amended recite specific property limitations for the interfaces:

> wherein interfaces bonding together structural components of an exemplary modular size class require more energy to propagate mechanical damage than interfaces bonding together originating within a modular size class structural component is energetically favored to propagate in a distributed fashion among said plurality of structural components contained within said modular size class structural components of said exemplary modular size class.

The only structures in Eida that possibly could be construed as a "modular size class" in accordance with the present application are the OEL material 3 and the color conversion material 2 (see Eida's Figure 4). These two structures comprise smaller structural elements: OEL material 3 comprises a plurality of OEL elements 31, and color conversion material comprises color conversion layers 22 and shielding layers 21. However, there is nothing in Eida that remotely suggests that the interface bonding OEL material 3 to color conversion material 2, namely, the transmittable medium 1, requires more energy to propagate mechanical damage than the interfaces bonding together the smaller components contained within the color conversion material 2 or the OEL material 3. Moreover, given the extraordinarily broad variety of materials presented in Eida as acceptable for use in shielding layers, color conversion layers, and the transmittable medium, there is nothing to suggest that the mechanical damage resistance of the interfaces would be inherent to the apparatus described in this reference. Eida is silent on the mechanical property requirements of the apparatus, particularly those of the various interfaces present in the system, and thus does not anticipate the interfaces as recited in claims 1 and 20 of the present application.

In view of the above remarks, Applicants respectfully submit that claims 1 and 20 are allowable over Eida. Furthermore, claims 3-6 and 8-17 depend from claim 1, and claims 24-25 depend from claim 20. Applicants respectfully submit that these dependent claims are allowable because each depends from an allowable independent claim.

3. Conclusion

In light of the remarks and amendments presented herein, Applicants believe that this serves as a complete response to the subject Office Action. If, however, any issues remain unresolved, the Examiner is invited to telephone the undersigned at the number provided below.

Respectfully submitted,

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